

A Snapshot of Blood Homocysteine Levels

Cholesterol isn't the only blood component associated with the risk of heart disease and stroke. Since the early 1990s, the amino acid homocysteine—a by-product of amino acid metabolism—has emerged as another important risk factor.

Researchers believe that when body cells dump too much homocysteine into the blood, artery linings become irritated, encouraging the formation of plaque—fatty deposits that cling to artery walls.

One cause of this dumping is a low intake of folate, vitamin B6, or vitamin B12, according to earlier findings by researchers at the Jean Mayer USDA Human Nutrition Research Center on Aging at Tufts University in Boston, Massachusetts. Body cells need these three B vitamins to convert the amino acid methionine to cysteine. When any one is lacking, the intermediate product in the conversion, homocysteine, builds up.

In 1993, the Boston researchers were first to report homocysteine levels in any population—more than 1,100 elderly in the original Framingham (Massachusetts) Heart Study. Even in this relatively narrow age range—67 to 96 years—homocysteine levels increased with age. Men had higher levels than women, but the difference narrowed at the upper ages.

Two years later, Norwegian researchers reported similar age and gender differences among the middle-aged population in their country. Smaller population samples in the United States and Europe generally support these findings.

But the studies covered specific age groups and were not representative of the U.S. population as a whole.

“We wanted to describe serum homocysteine concentrations across our population and test for differences among sex, age, race, and ethnicity,” says Paul

F. Jacques, an epidemiologist at the USDA center involved in the earlier study.

In the current study, Jacques and his Boston colleagues collaborated with scientists affiliated with the Centers for Disease Control and Prevention in Atlanta, Georgia, and Hyattsville, Maryland. Using blood serum samples from the latest National Health and Nutrition Examination Survey, they measured homocysteine levels for 3,766 males and 4,819 females from age 12 up.

The results “confirm the age and sex differences reported in nonrepresentative samples,” says Jacques. Homocysteine levels increased with age. They were also significantly higher in males

Increases in homocysteine are strongly associated with higher risk of vascular disease.

than females, regardless of whether the subjects were white or black with no Hispanic or Mexican-American background. Levels were closest between the two genders in the young and old, diverging around puberty and converging after menopause.

The researchers suspect that impaired kidney function may contribute to the higher levels in older people.

Body size, estrogen, and vitamin status may explain the difference between genders, they say. Larger people have more creatinine—a protein breakdown product—circulating in their blood. And studies show a strong correlation between circulating creatinine and homocysteine levels. Also, “estrogen seems to protect against high homocysteine,” says Jacques, judging by the lower levels

in premenopausal women. Further, women are more conscious about nutrition. The women in the study had a higher folate status than the men.

Mexican-American females had the study's lowest homocysteine levels—significantly lower than non-Hispanic black and white subjects. Jacques says nutrition may explain part, but not all, of the difference. He has not yet analyzed the data to look for other factors.

“It's crucial we understand the basis for these age and gender differences,” he adds, “because fairly modest increases in homocysteine are strongly associated with higher risk of vascular disease.—

By Judy McBride, ARS.

This research is part of Nutrient Requirements, Food Composition, and Intake, an ARS National Program described on the World Wide Web at <http://www.nps.ars.usda.gov/programs/107s2.htm>.

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